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EXAMINER  
LEUNG, JENNIFER A

ART UNIT PAPER NUMBER

1764

DATE MAILED: 03/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/060,737

Applicant(s)

HUANG ET AL.

Examiner

Jennifer A. Leung

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5,7,8,10-12,14,15 and 17-26 is/are pending in the application.
- 4a) Of the above claim(s) 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,8,10-12,14,15,17-19 and 21-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 11, 2003 has been entered.

#### ***Response to Amendment***

2. Applicant's amendment submitted on December 11, 2003 has been received and carefully considered. Claims 6, 9, 13 and 16 are cancelled. Claim 20 is withdrawn. Claims 1-5, 7, 8, 10-12, 14, 15, 17-19 and 21-26 remain active.

#### ***Response to Arguments***

3. Applicant's arguments filed December 11, 2003, with respect to the rejection(s) of amended claims 1-5, 8, 10-12, 14, 17-19 and 23-26 under 35 U.S.C. 103(a) as being unpatentable over Masel et al. (US 6,193,501) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the newly found prior art references (see below).

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-5, 11, 15, 19, 22, 23 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Loeb (US 1,753,897).

Regarding claims 1 and 15, Loeb (see Figure) discloses an apparatus comprising:  
walls forming a chamber having an outlet (i.e., a combustion chamber **s** defined by walls **a**, **b**  
and having an outlet screen **f**; lines 20-25);  
an evaporator (i.e., fuel chamber **r**; lines 9-19 and 44-58) adjacent the chamber **s** for evaporating  
a fluid reactant (i.e., a liquid fuel such as gasoline; lines 10-17) supplied through a non-  
pressurized inlet (i.e., fill opening **d**) and introducing the evaporated fluid reactant into  
the chamber **s** (i.e., via screened opening **c**);  
a feed path (i.e., defined by opening **d**, via cotton **o** or the like) for supplying the fluid reactant to  
the evaporator **r**; and  
an initiator (i.e., electrodes **h**, **k**, inherently comprising spark wires; lines 26-43) for igniting the  
evaporated fluid reactant in chamber **s**.

Regarding claims 2-5, Loeb discloses a first inlet (i.e., screened opening **f**) for  
introducing a non-pressurized oxidizer (i.e., air) into the chamber **s** for forming a mixture of the  
evaporated fluid and the oxidizer, wherein the initiator provides energy to combust the mixture  
of the evaporated fluid and the oxidizer (see lines 47-58).

Regarding claim 11, Loeb (lines 44-58) discloses the evaporator **r** is located substantially  
adjacent to and gaseously connected to combustion chamber **s** via screened opening **c** (Figure).

Regarding claims 19 and 26, Loeb discloses no valves, chemical pumps, pressurized chemical lines or pumps (i.e., no mechanical moving parts) for operation of said device.

Regarding claim 22, Loeb discloses the evaporator **r** delivers the chemical in a non-pressurized state (i.e., vaporized gasoline) to the chamber **s** (see lines 9-19, 44-58).

Regarding claim 23, the combustion of the evaporated fluid in the apparatus of Loeb inherently generates an acoustic wave for drawing the oxidizer from the first inlet **f** into the chamber **s**, as evidenced by the disclosure that upon initiation of combustion, "air enters through the screen **f**," (lines 51-58).

Instant claims 1-5, 11, 15, 19, 22, 23 and 26 structurally read on the apparatus of Loeb.

5. Claims 1-5, 7, 8, 11, 12, 14, 19, 21 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Young et al. (US 6,162,046).

Regarding claims 1 and 11, Young et al. discloses an apparatus comprising:  
walls forming a chamber having an outlet (i.e., passageway **104**, defining a mixing chamber **100**  
and having a combustion zone **106** at its outlet; FIG. 4; column 16, lines 39-61); and  
an evaporator (i.e., comprising porous member **14** and defined by vapor impermeable shroud **24**,  
having a vaporization zone **16**; FIG. 1) located substantially adjacent to the chamber **100**,  
wherein the evaporator evaporates a fluid reactant supplied through a non-pressurized  
inlet (i.e., fuel from ambient pressure reservoir **34** supplied through liquid feed surface  
**12**; FIG. 1, 2; column 4, lines 60-65) and introduces the evaporated fluid reactant into the  
chamber **100** (i.e., via vapor release surface **18** and vapor permeable passage **22**; FIG. 1).  
Young et al. further discloses the apparatus comprises a feed path (i.e., wick **50** and shroud **52** of  
liquid feed system **10**; FIG. 1-3) for supplying the fluid reactant to the evaporator, and an

initiator for igniting the evaporated fluid reactant in the chamber (see column 17, lines 30-40).

Regarding claim 2-5, Young et al. discloses a first inlet (i.e., supply channel **102**; FIG. 4; column 16, lines 40-61) for introducing a non-pressurized oxidizer (i.e., ambient air) into the chamber **100** for forming a mixture of the evaporated fluid and the oxidizer; wherein the initiator provides energy to combust **106** the mixture of the evaporated fluid and the oxidizer, inherently sending a pressure wave through an outlet (see column 17, lines 30-61).

Regarding claims 7 and 21, Young et al. discloses the evaporator comprises a membranous pad containing a plurality of patterned holes and grooves (i.e., hot seat assembly **72**, comprising vapor permeable members **74**, **76** having a plurality of parallel grooves **82** and through holes **84**; column 15, lines 45 - column 16, line 2; FIG. 3, 5A-C).

Regarding claim 8, Young et al. discloses the feed path **50**, **52** (FIG. 2, 3) comprises at least one channel (i.e., a plurality of capillary tubes; column 13, lines 12-40) for delivering the fluid to the evaporator.

Regarding claims 12 and 14, Young et al. discloses the reactant fluids comprising at least two different fluids (column 6, lines 30-44) supplied to the evaporator by at least two separate inlets (i.e., as defined by the plurality of capillary tubes in feed path **50**, **52**; column 13, lines 12-40), wherein the oxidizer is a gas supplied from outside the device (i.e., air provided at ambient temperature and pressure; FIG. 4; column 16, lines 40-61) and introduced to the chamber **100** through an inlet passing through the walls of the chamber (i.e., via combustion gas supply channel **102**) for mixing with at least two different evaporated fluids within the chamber **100**.

Regarding claims 19 and 26, no valves, chemical pumps, pressurized chemical lines, pumps or moving mechanical parts are required for device operation (column 6, lines 54-61).

Regarding claims 23-25, no further structural limitations are recited, since the “acoustic wave”, “wavefront” and “pulsating wave characteristic” are not considered elements of the apparatus, but process limitations relating to the intended use of the apparatus. Therefore the apparatus of Young et al. meets the claims. In any event, the wave characteristics are inherently controllable in the apparatus of Young et al., as evidenced by, “an adjustable combustion output feature,” for modulating the combustion output by increasing or decreasing the flow of fuel to the combustion zone (column 17, lines 41-61; see also, column 5, lines 31-33).

Instant claims 1-5, 7, 8, 11, 12, 14, 19, 21 and 23-26 structurally read on the apparatus of Young et al.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 10, 17, 18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 6,162,046).

Regarding claim 10, Young et al. discloses the evaporator may comprise, “[f]ibrous

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materials such as fiberglass mats, other types of woven and non-woven fibrous materials, and porous ceramic, low conductivity porous or fibrous metallic materials and porous metal/ceramic composites,” (column 10, lines 37-55). Young et al. further discloses the chamber comprising, “a rigid material having a generally high thermal conductivity, such as a copper or copper alloy,” (column 16, lines 57-61), and the initiator comprising, “[v]arious ignition systems, including catalytic initiation systems... adapted for use in combustion apparatus of the present invention,” (column 17, lines 30-40).” However, Young et al. is silent as to the materials for the chamber and initiator comprising, specifically, “silicon, plastic, ceramic, and glass based material.” In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate material, such as the recited materials, for the components of the apparatus of Young et al., on the basis of suitability for the intended use and absent showing any unexpected results, because the use of such materials in high temperature or combustion apparatuses is well known in the art.

Regarding claims 17 and 18, Young et al. discloses,

*“A steady state condition can be achieved and maintained wherein liquid fuel provided to the liquid feed surface of the porous member at substantially ambient pressures and temperatures is heated and pressurized within the vaporization/pressurization module using a portion of the heat generated in the burner to produce one or more pressurized vapor jets(s), which in turn are used for combustion,”* (column 5, lines 53-60).”

Although Young et al. is silent as to the apparatus comprising at least one temperature sensor and at least one pressure sensor, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such sensors to the apparatus of Young et al., on the basis of suitability for the intended use and absent showing any unexpected results, since the provision of temperature and pressure sensing elements to control systems for enabling the



detection and subsequent control of process variables to a steady state is well known in the art.

Regarding claim 22, Young et al. discloses the evaporator delivers vapor to the chamber at a pressure greater than the pressure of liquid feed; the liquid feed pressure being substantially atmospheric (column 9, lines 25-36, 60 to column 10, line 14). Young et al. further disclose,

“... the *degree of vapor pressurization*, and amount of pressurized vapor released from the vaporization/ pressurization module may be modulated, for example, by varying the pore size of the porous member, by providing porous members having different thermal conductivity properties, by changing the configuration or arrangement of porous member 14, by varying the number, size and/or location of vapor permeable apertures in the substantially vapor impermeable barrier, by modulating the amount of vapor release, and/or by adjusting the amount of heat provided to the vaporization zone,” (column 11, line 48 to column 12, line 6).

Young et al., however, is silent as to whether the chemical may be delivered to the chamber in a non-pressurized state. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to configure the evaporator of Young et al. to deliver the chemical to the chamber in a non-pressurized state, on the basis of suitability for the intended use, by merely varying the number, size and/or location of vapor permeable apertures, for instance, to allow for equalization of flow into and out of the evaporator, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, the use of evaporators for delivering vapors in a non-pressurized state, depending on a given application, is conventionally known in the art (see column 3, lines 21-25).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Young et al. (US 6,162,046) in view of Loeb (US 1,753,897).

Young et al. discloses that the combustion may be initiated by, “[h]eating the burner

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assembly for a few seconds using a match or a lighter,” and furthermore, “[v]arious ignition systems... may *alternatively be adapted* for use in combustion apparatus of the present invention,” (column 17, lines 30-40). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate, alternative ignition system (i.e., such as the instantly recited “spark or glow wires”) for the initiator in the apparatus of Young et al., on the basis of suitability for the intended use, because such initiators are well known in the art, as evidenced by Loeb (the same comments apply, see above), and furthermore, substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958).

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Glezer et al. (US 6,554,607) discloses an apparatus similar to Applicant's disclosed invention, wherein the apparatus (i.e., actuator **18**; FIG. 2) comprises a chamber **24** that may be manufactured according to micro-electro-mechanical systems (MEMS) technologies (column 2, line 64 to column 3, line 19), utilized for combusting a pressurized, fluid reactant comprising a fuel and an oxidizer present in a liquid state under high pressure and a gaseous state after expansion (column 4, lines 44-55). The apparatus further comprises a spark ignition electrode **32** for initiating the combustion of the fluid reactants and manipulating the frequency of the combustion gases exiting through outlet **28** of actuator **18** (column 5, lines 38-61). The apparatus of Glezer et al. differs from the apparatus as disclosed by Applicants because it

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comprises pressurized inlets for delivering pressurized fuel and oxidizer to the combustion chamber 24. However, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to modify the apparatus of Glezer et al. such that a non-pressurized, fluid reactant in a liquid state was supplied to the actuator 18 via an evaporator, as taught by Young et al., above. The use of non-pressurized liquid fuels, opposed to the highly pressurized liquid fuels of Glezer et al., is advantageous from a safety standpoint, since, "... storage of these fuels in a liquid form necessitates the use of pressurized fuel canisters that are inconvenient to use and transport, are frequently heavy, may be explosion hazards, and require valves which are prone to leaking," as taught by Young et al. (column 1, lines 51-64).

\* \* \*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung  
March 3, 2004 *JAL*

*Hien Tran*

**HIEN TRAN**  
**PRIMARY EXAMINER**